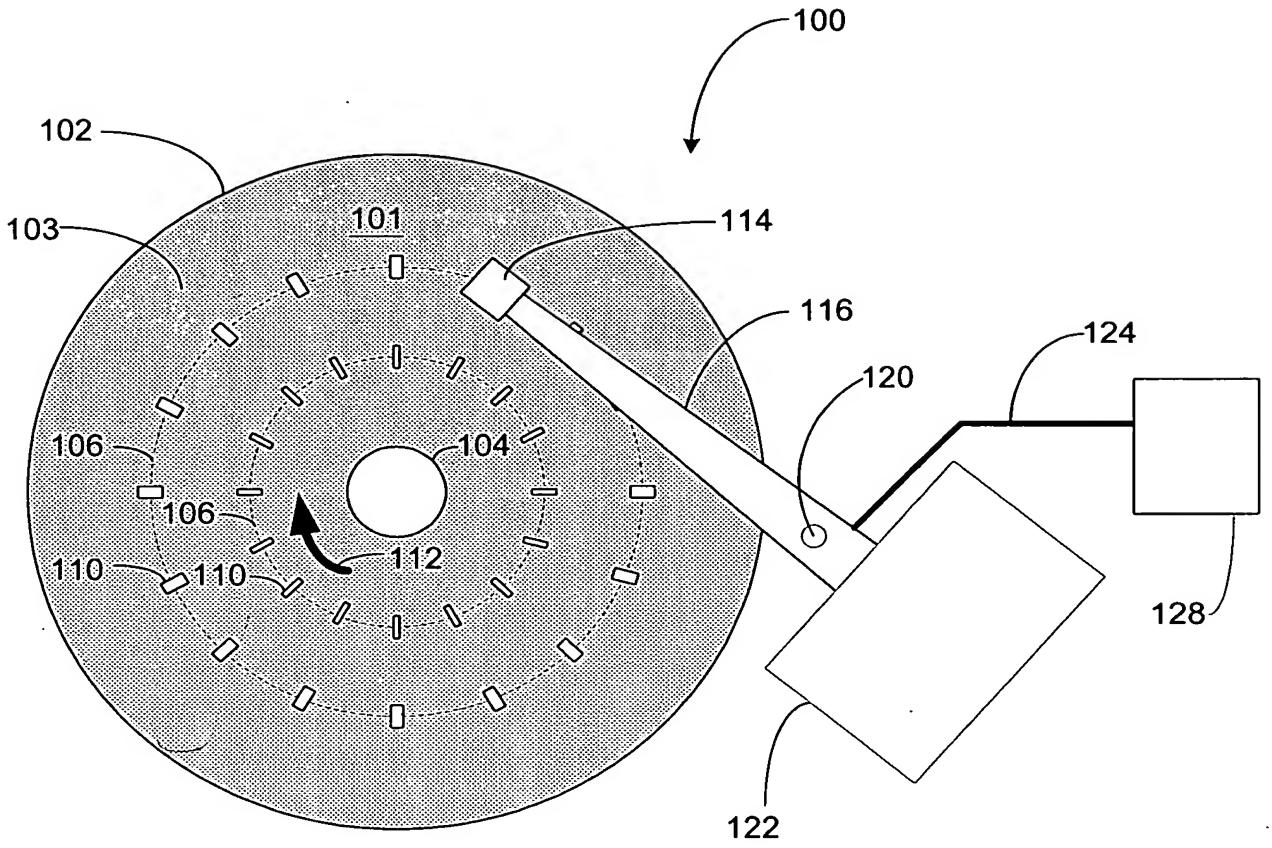


FIGURE 1A

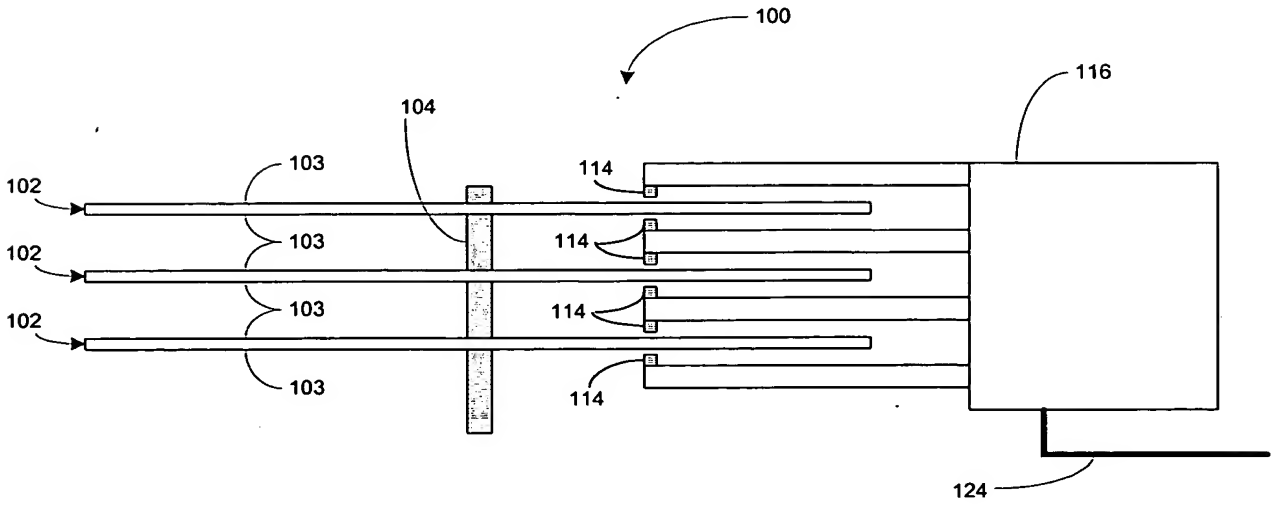


FIGURE 1B

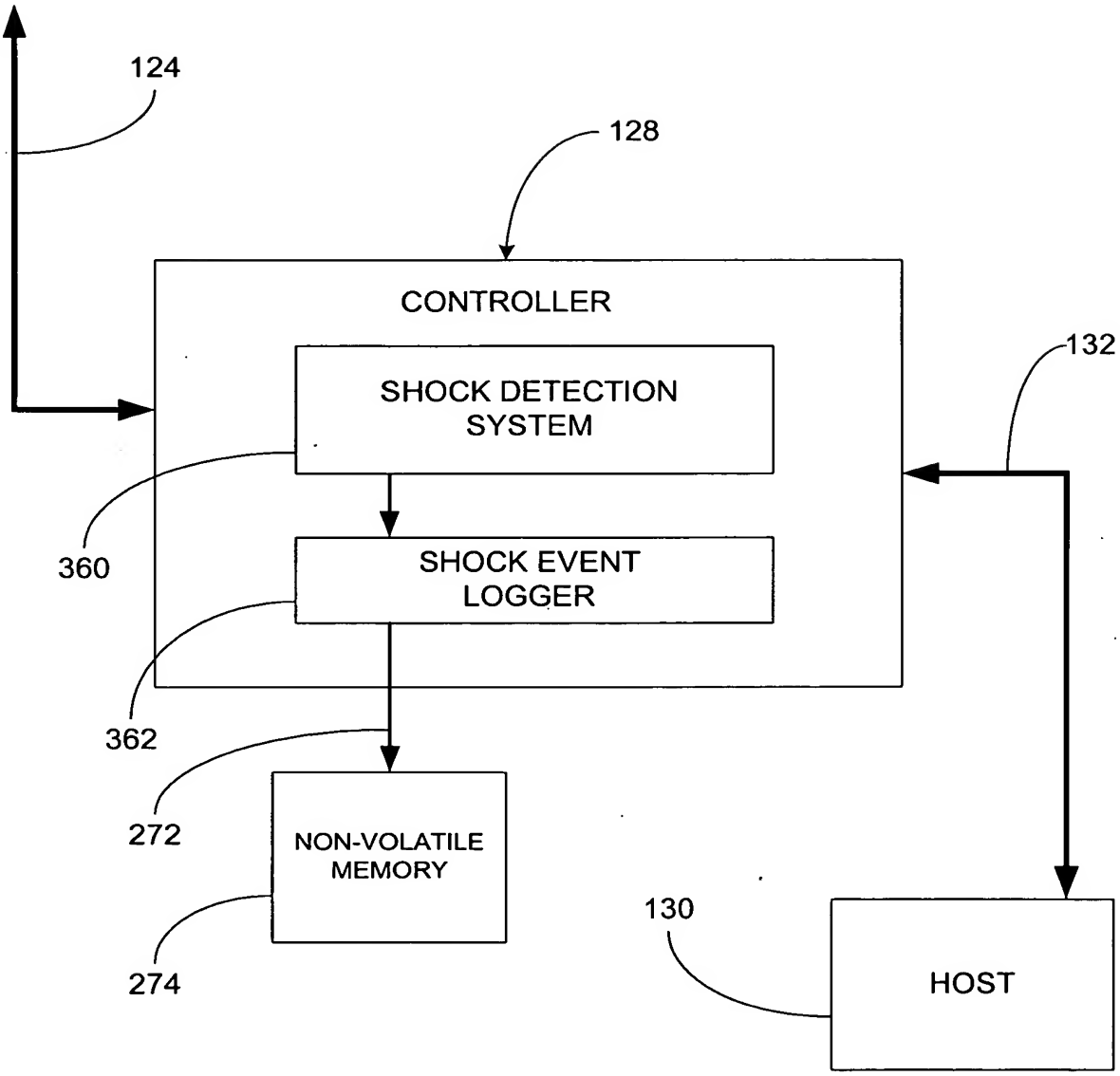

124
128
CONTROLLER
SHOCK DETECTION SYSTEM
132
360
SHOCK EVENT LOGGER
362
272
NON-VOLATILE MEMORY
130
HOST
274

FIGURE 2

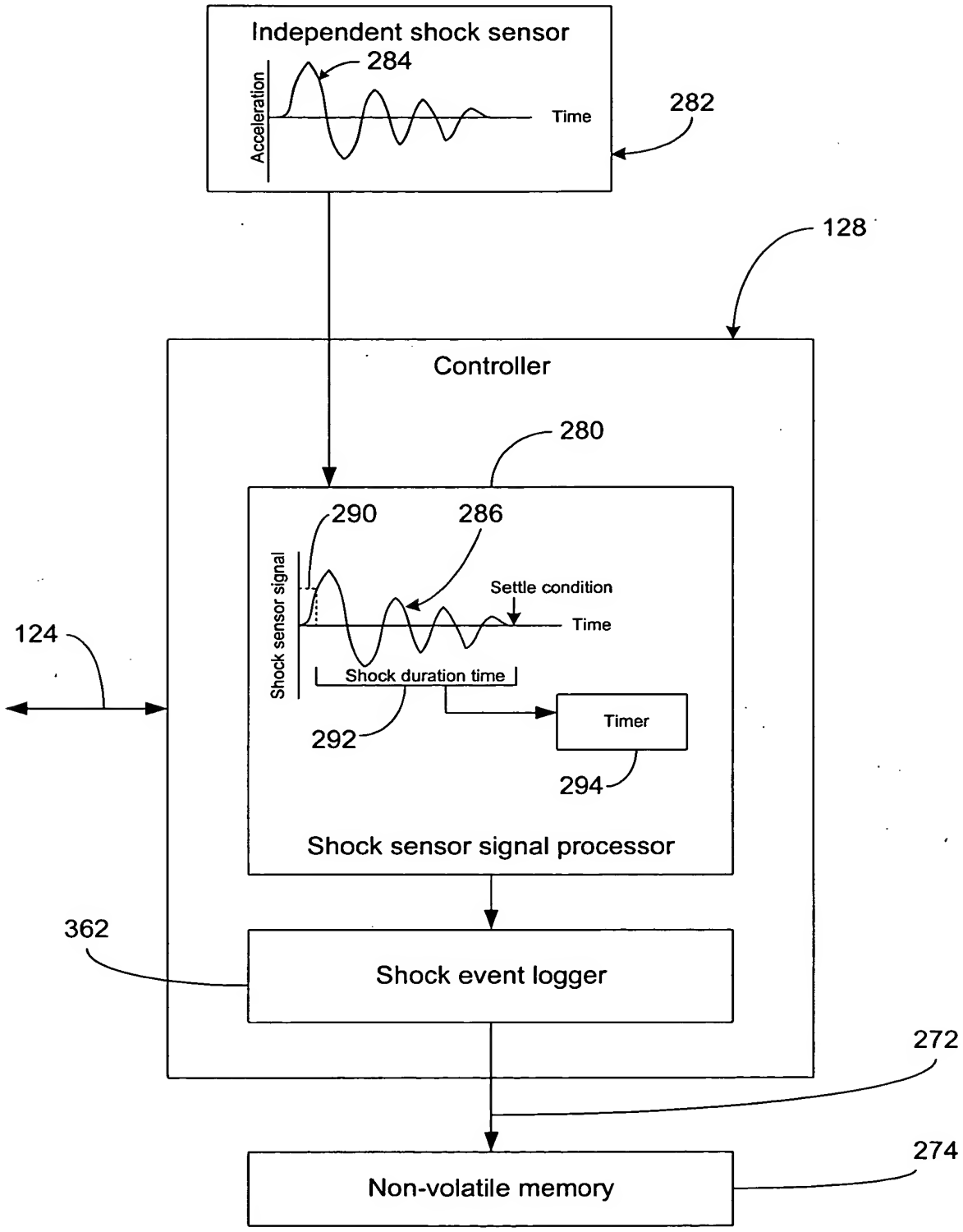

Independent shock sensor
284
Acceleration
Time
282
128
Controller
280
290
286
Shock sensor signal
Settle condition
Time
124
Shock duration time
292
Timer
294
Shock sensor signal processor
362
Shock event logger
272
274
Non-volatile memory

FIGURE 3A

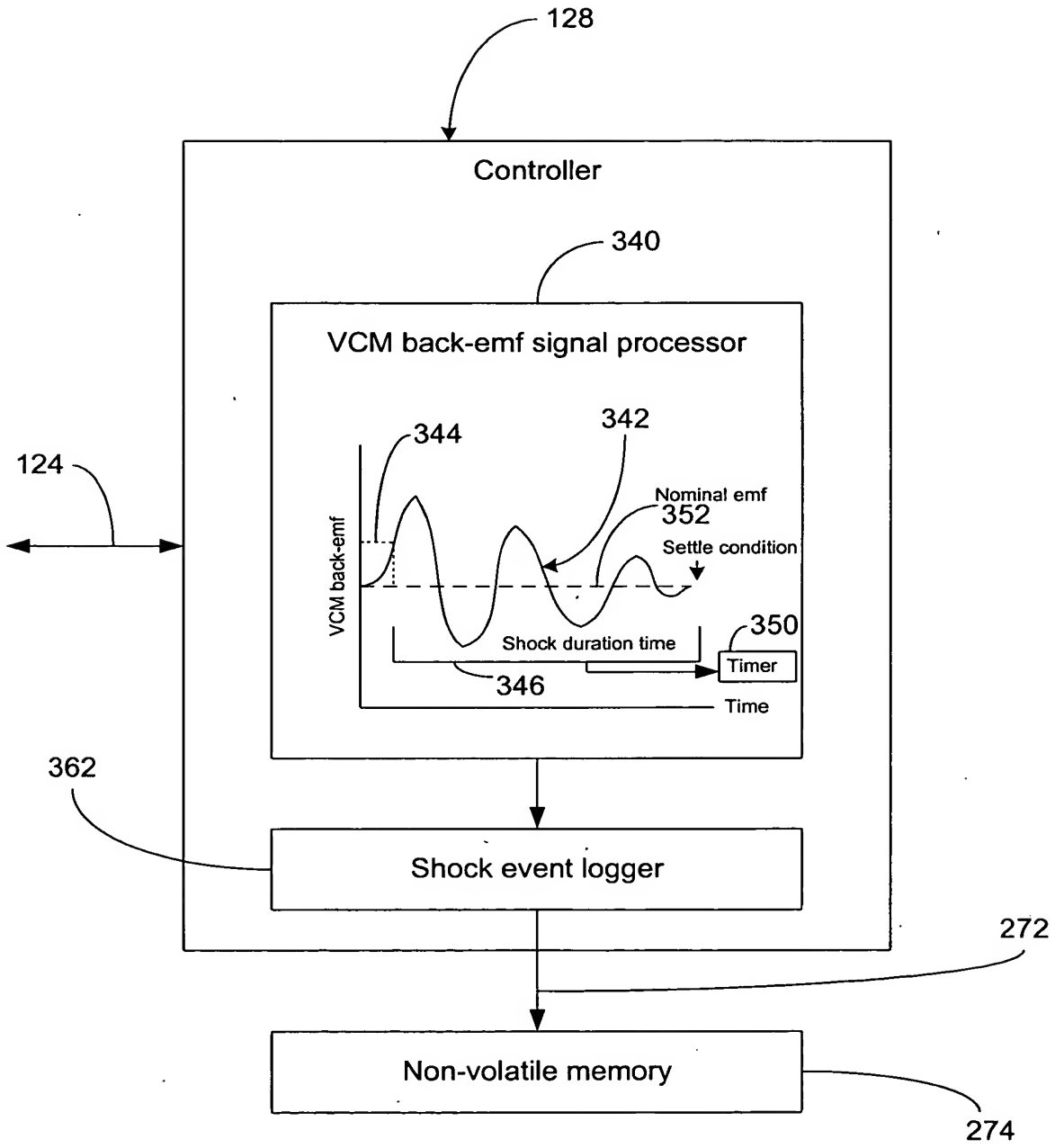

128
Controller
340
VCM back-emf signal processor
344
342
124
Nominal emf
352
Settle condition
VCM back-emf
350
Shock duration time
Timer
346
Time
362
Shock event logger
272
Non-volatile memory
274

FIGURE 3B

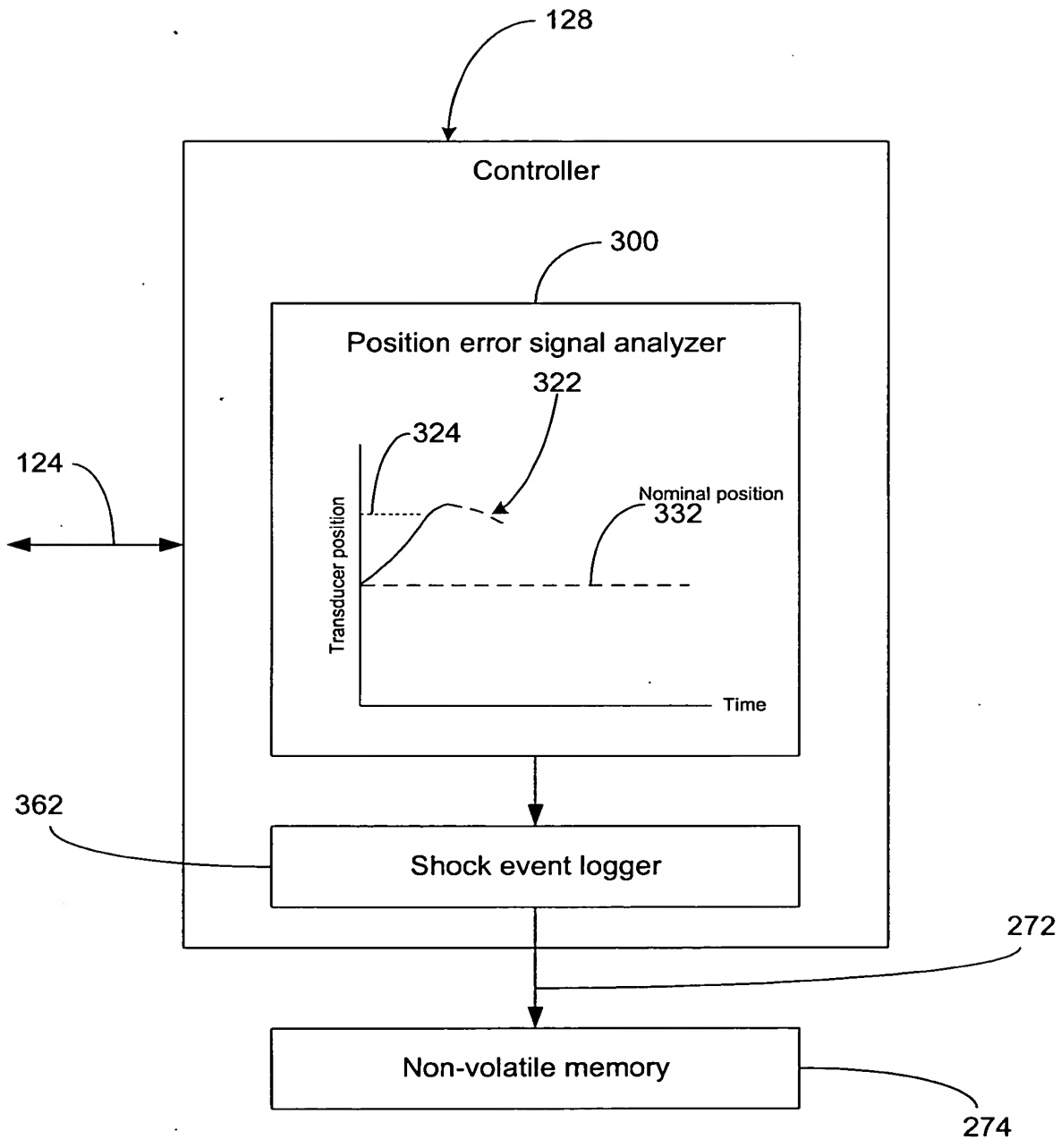

128
Controller
300
Position error signal analyzer
322
324
124
Nominal position
332
Transducer position
Time
362
Shock event logger
272
Non-volatile memory
274

FIGURE 3C

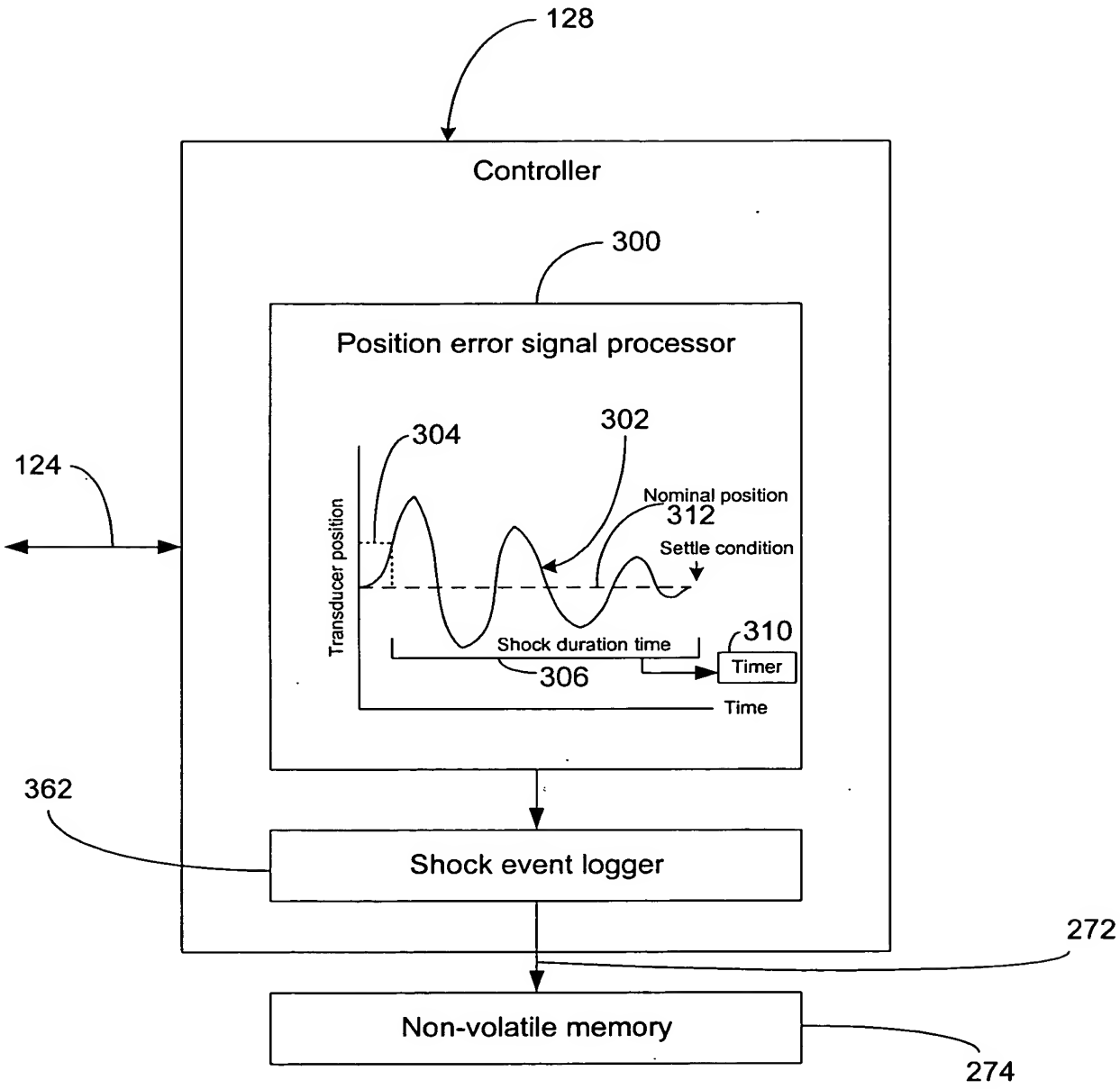

128
Controller
300
Position error signal processor
304
302
124
Nominal position
312
Settle condition
Transducer position
310
Shock duration time
Timer
306
Time
362
Shock event logger
272
Non-volatile memory
274

FIGURE 3D

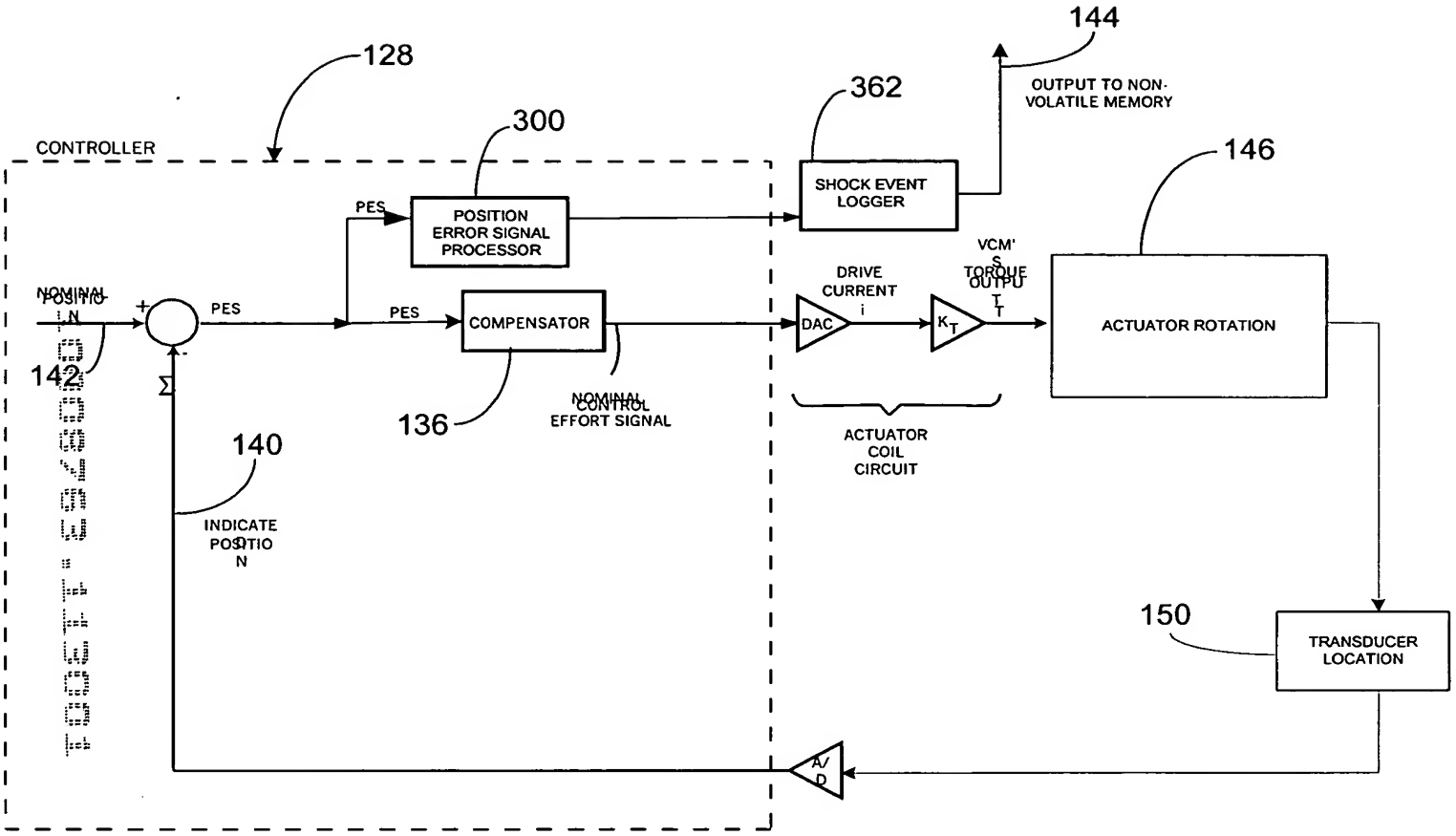

144
128
362
OUTPUT TO NON-VOLATILE MEMORY
300
CONTROLLER
SHOCK EVENT LOGGER
146
PES
POSITION ERROR SIGNAL PROCESSOR
VCM' S TORQUE OUTPUT T
DRIVE CURRENT i
NOMINAL POSITIO N
PES
PES
COMPENSATOR
DAC
K_T
ACTUATOR ROTATION
142
136
NOMINAL CONTROL EFFORT SIGNAL
ACTUATOR COIL CIRCUIT
140
INDICATE POSITIO N
150
TRANSDUCER LOCATION
A/D

FIGURE 4

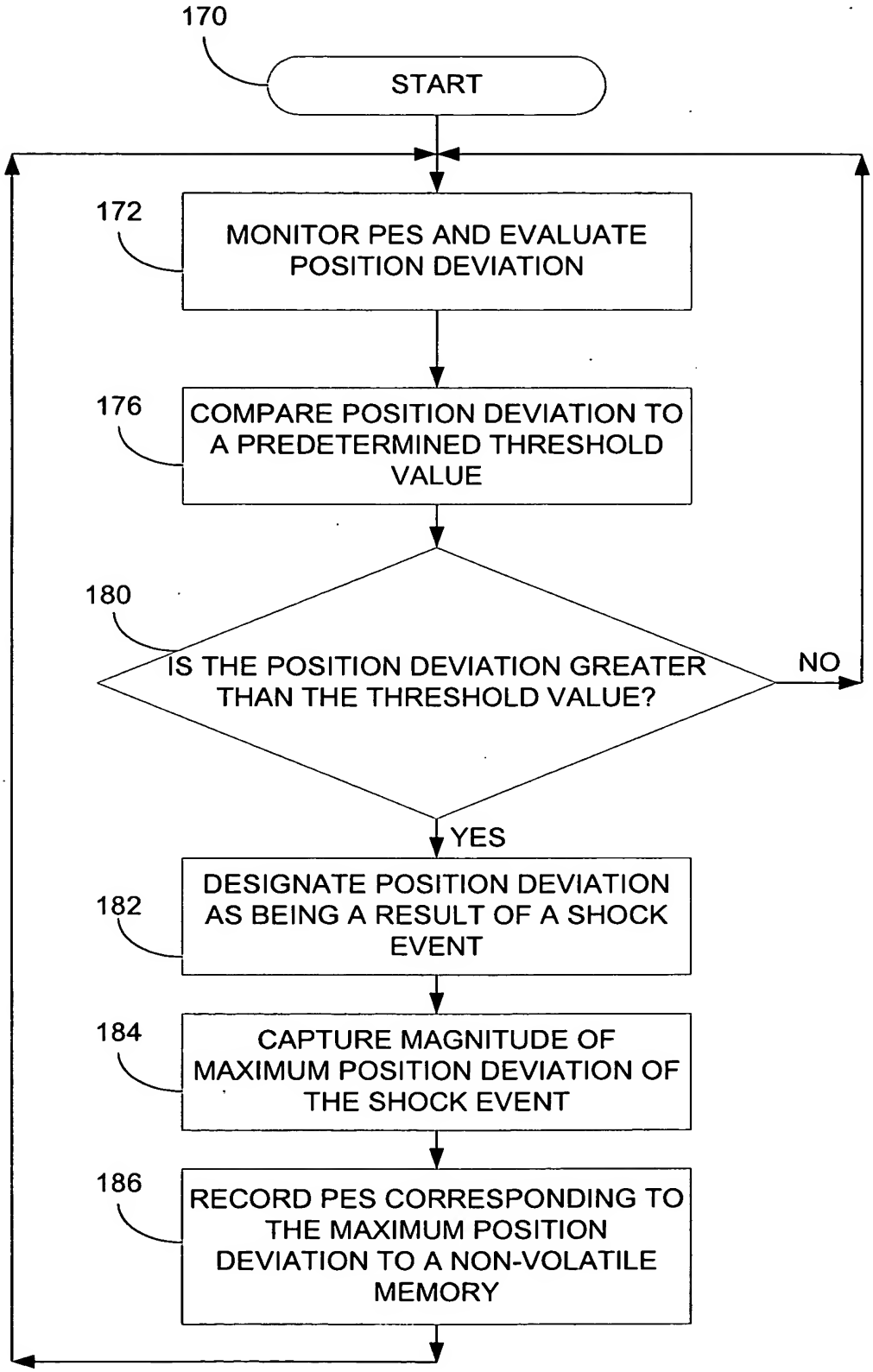

170
START
172
MONITOR PES AND EVALUATE POSITION DEVIATION
176
COMPARE POSITION DEVIATION TO A PREDETERMINED THRESHOLD VALUE
180
IS THE POSITION DEVIATION GREATER THAN THE THRESHOLD VALUE?
NO
YES
182
DESIGNATE POSITION DEVIATION AS BEING A RESULT OF A SHOCK EVENT
184
CAPTURE MAGNITUDE OF MAXIMUM POSITION DEVIATION OF THE SHOCK EVENT
186
RECORD PES CORRESPONDING TO THE MAXIMUM POSITION DEVIATION TO A NON-VOLATILE MEMORY

FIGURE 5

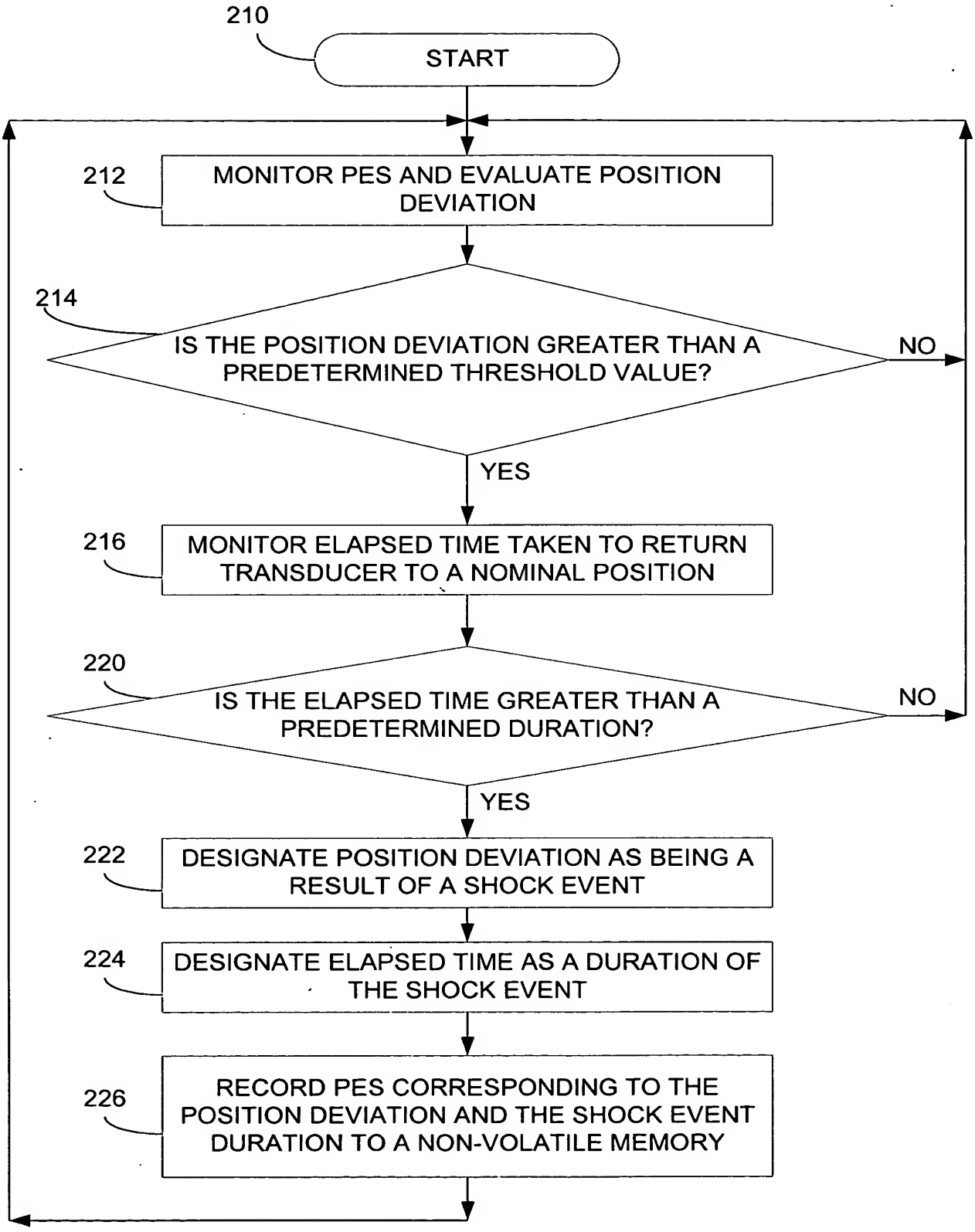

210
START
212
MONITOR PES AND EVALUATE POSITION DEVIATION
214
IS THE POSITION DEVIATION GREATER THAN A PREDETERMINED THRESHOLD VALUE?
NO
YES
216
MONITOR ELAPSED TIME TAKEN TO RETURN TRANSDUCER TO A NOMINAL POSITION
220
IS THE ELAPSED TIME GREATER THAN A PREDETERMINED DURATION?
NO
YES
222
DESIGNATE POSITION DEVIATION AS BEING A RESULT OF A SHOCK EVENT
224
DESIGNATE ELAPSED TIME AS A DURATION OF THE SHOCK EVENT
226
RECORD PES CORRESPONDING TO THE POSITION DEVIATION AND THE SHOCK EVENT DURATION TO A NON-VOLATILE MEMORY

FIGURE 6

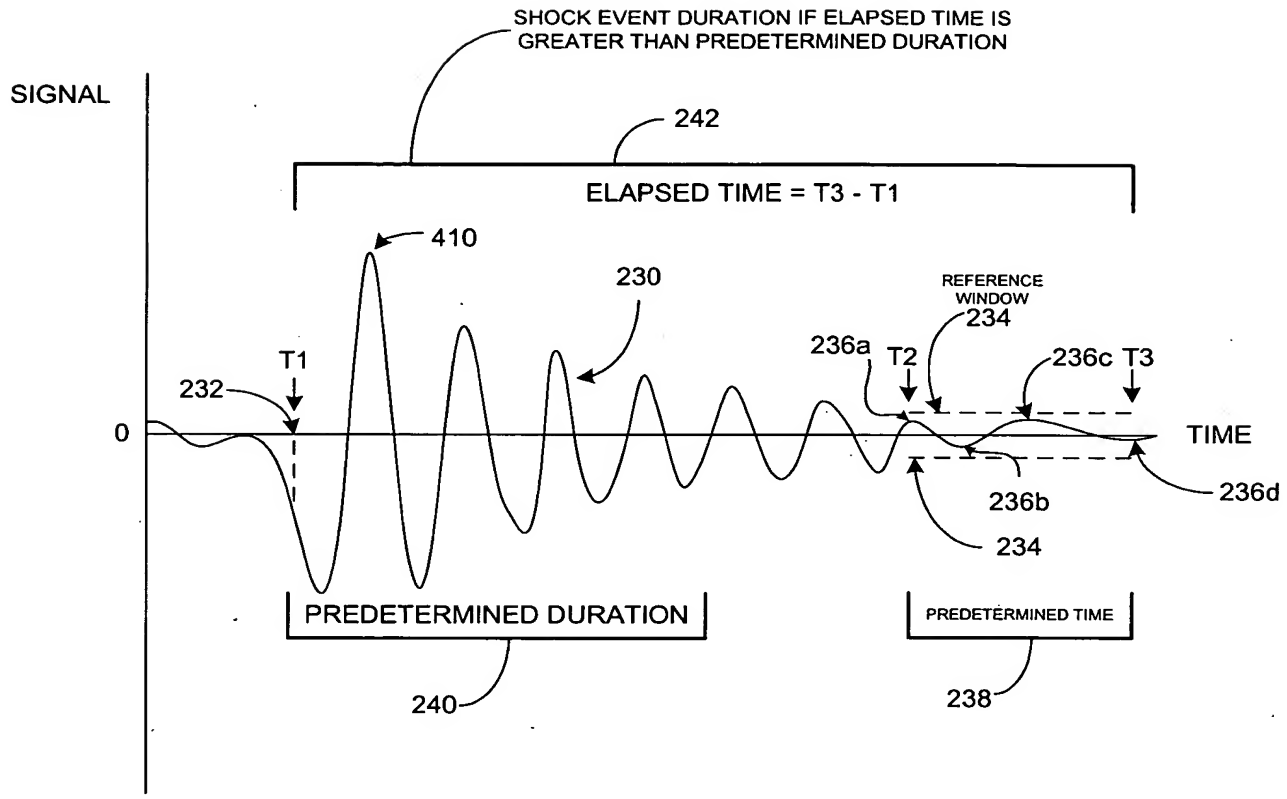

SHOCK EVENT DURATION IF ELAPSED TIME IS GREATER THAN PREDETERMINED DURATION
SIGNAL
242
ELAPSED TIME = T3 - T1
410
230
REFERENCE WINDOW
234
236a
T2
236c
T3
T1
232
0
TIME
236b
236d
234
PREDETERMINED DURATION
PREDETERMINED TIME
240
238

FIGURE 7

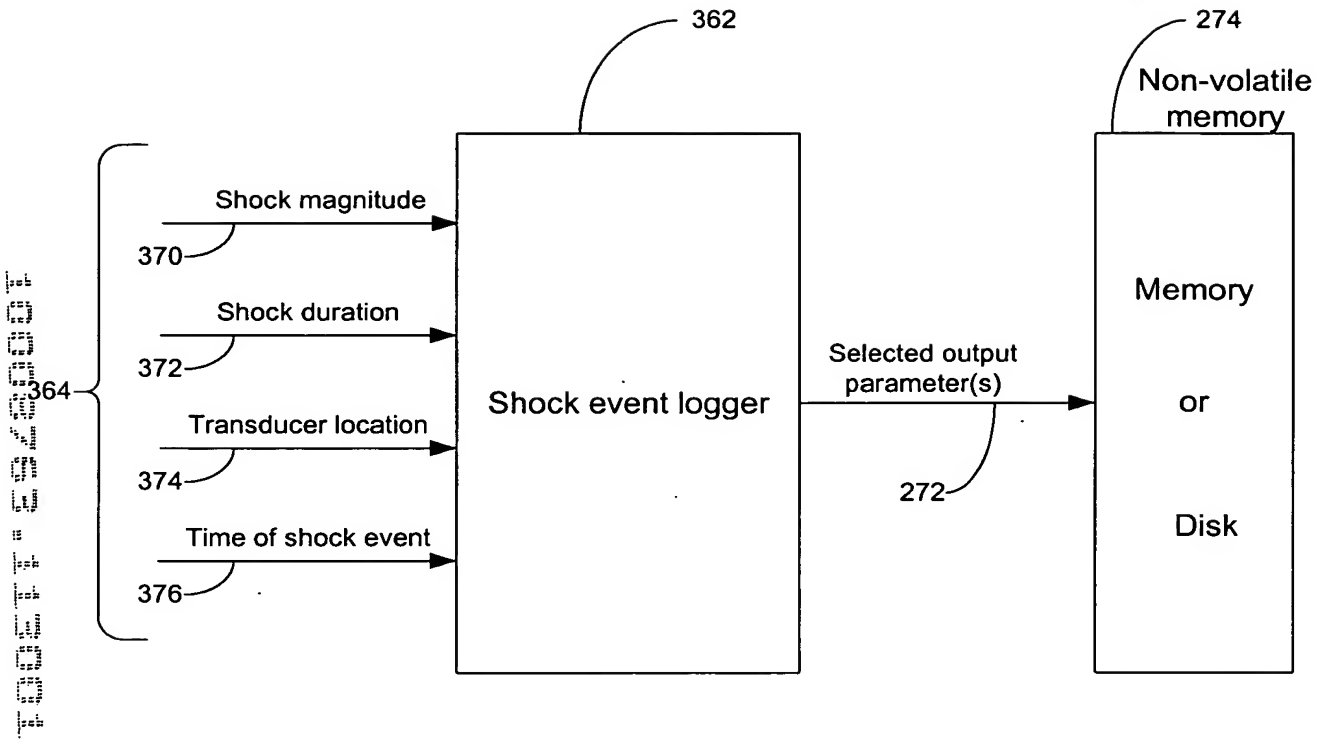

362
274
Non-volatile memory
Shock magnitude
370
Shock duration
372
364
Transducer location
374
Time of shock event
376
Shock event logger
Selected output parameter(s)
272
Memory
or
Disk

FIGURE 8

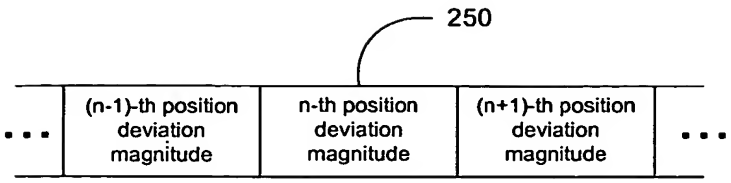


FIGURE 9A

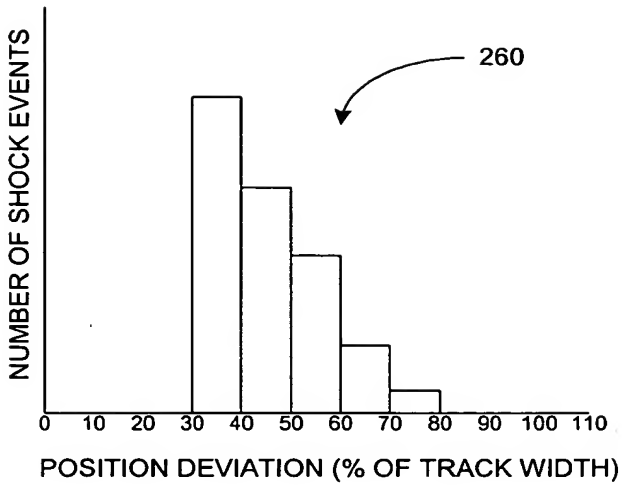


FIGURE 9B

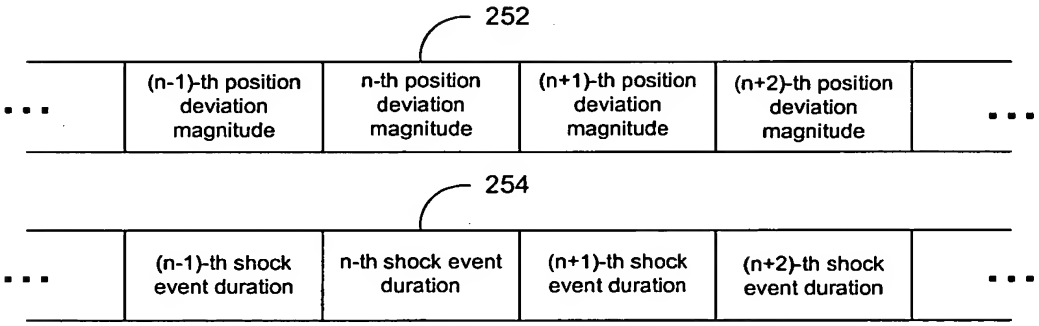
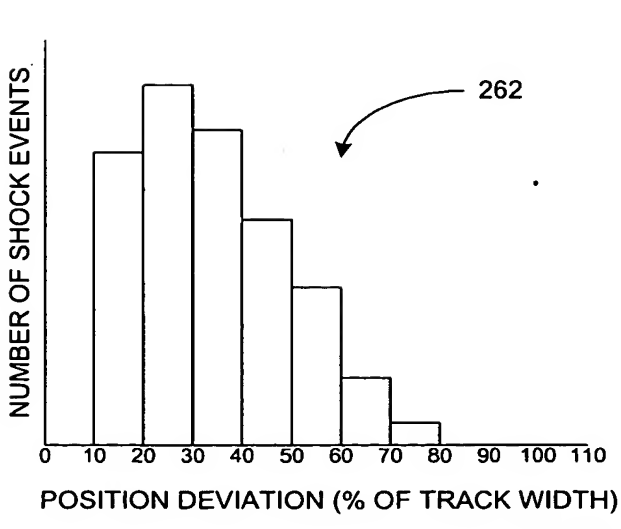


FIGURE 9C



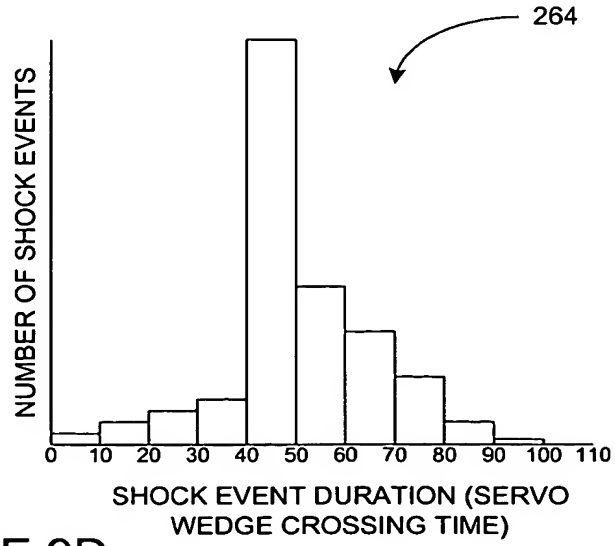


FIGURE 9D

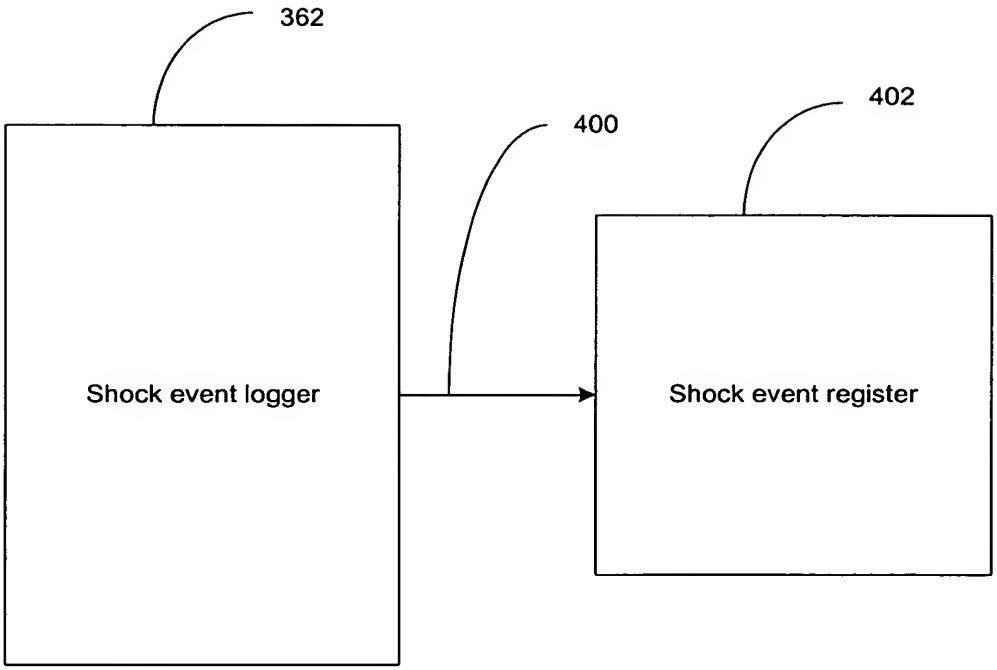


FIGURE 9E